Foreign Exchange Markets, Exchange Rate Determination, and International Arbitrage

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Foreign Exchange Markets:

In this section, we will identify the:
Markets
Players
Ways of Quoting Foreign Exchange
Players in the FX Market

Two tiers of the foreign exchange market:

- **interbank or wholesale market** = transactions between banks and nonbank financial institutions (investment banks)
  - About 82% of market
- **client or retail market** transactions between bank and customer
  - About 18% of market

Within two tiers, participants include:

- bank and nonbank foreign exchange dealers
- foreign exchange brokers
- individuals and firms
- Speculators and Arbitrageurs
- Central Banks and Treasuries
Types of FX Transactions

1. Spot Market for Foreign Exchange
   - Transactions involving almost immediate delivery of foreign exchange
   - Settlement-- 2 business days after trade (1 day for Canada & Mexico)
   - Organized as an over-the-counter market—i.e. transactions do not take place in centralized location
   - Is a 24 hour market
   - Bulk of trading occurs in the interbank market

2. The Forward Market
   The Forward exchange rate is the rate contracted today for delivery of currency at some specified date in the future

   Set the price today, but all payments occur at maturity of contract

   The forward market can be used to hedge against changes in the exchange rate because it allows one to lock in a price today
Forward contracts traded in interbank market

Contracts are flexible in terms of **maturity dates** and **amounts**

Though they eliminate uncertainty, forward contracts are not risk-free:

“gains” and “losses” on forward positions depend on the spot rate at maturity

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**Example:**

Suppose today you contract to buy British pounds 30 days forward at $1.50/BP

Suppose 30 days from now when the forward contract matures, the prevailing spot exchange rate is $1.55/BP. Have you gained or lost by holding the forward contract?

Suppose instead the prevailing spot rate is $1.45/BP. Have you gained or lost by holding the forward contract?
Hence,
One “gains” by buying currency forward if the spot rate rises above the forward rate

One “gains” by selling currency forward if the spot rate falls below the forward rate

**Forward Premiums/Discounts:**

When we pay more for forward than for spot delivery of FX, we say that the FX is at a **forward premium**
i.e. If $F(\$/£) > S(\$/£) £ is at a forward premium

When we pay less for forward than for spot delivery of FX, we say that the FX is at a **forward discount**
i.e. If $F(\$/£) < S(\$/£) £ is at a forward discount
The n-year forward premium or discount of the FX against the $ on an annual basis is equal to:
\[ \frac{(F_{t,T}($/FX)- S($/FX))}{S($/FX)} \cdot \frac{360}{T}, \]
where, \( F_{t,T} \) = forward rate with \( T \) days to maturity

Example:
\( F_{t,30} = $1.50/\£ \quad S(\$/\£) = $1.495/\£ \)

30-day discount/premium on an annual basis = \[ \frac{($1.50/\£ - $1.495/\£ )}{$1.495/\£ } \cdot \frac{360}{30} \]
\[ = 0.0401 \text{ or } 4.01\% \]

What do premiums and discounts reflect?
(1) interest differentials
(see discussion of covered interest parity)
(2) Expected appreciation/depreciation if investors are risk-neutral

Because:
forward exchange rate \( \cong \) expectation of future spot rate

\( F(\$/\text{FX}) \cong E[ S(\$/\text{FX}) ] \)
Why???
Suppose $F_{90}(\$/£) = 1.45/£;

Suppose market expects the spot rate 90 days from now to be: $E[S(\$/FX)_{t+90}] = 1.50/£$

_This suggests the market expects to profit by buying British pounds forward for delivery in 90 days at $1.45, and then selling them at the spot rate 90 days from now for $1.50._

How would the market respond?
→ Would bid up forward rate

3. Currency Futures and Options

A currency futures contract allows one to exchange a specified amount of currency on a specified date in the future. Like a forward contract, it allows one to hedge against the risk of changes in exchange rates.

-- Futures contracts are traded in a centralized location (e.g. Chicago Mercantile Exchange)
-- contracts are _standardized_ in terms of dates and amounts
A currency option contract gives one the *right, but not the obligation,* to buy or sell currency at a fixed price at some point in the future.

options contracts are traded on a centralized exchange (e.g. Philadelphia Options Exchange), or over-the-counter (OTC))

contracts can be standardized or flexible

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**Market Statistics**

Avg. Daily Global Net Turnover on Spot/Forward contracts: April 2001

<table>
<thead>
<tr>
<th></th>
<th>$billions</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spot</td>
<td>$387</td>
<td>33%</td>
</tr>
<tr>
<td>Forward</td>
<td>787</td>
<td>67%</td>
</tr>
<tr>
<td>Outright</td>
<td>131</td>
<td>11%</td>
</tr>
<tr>
<td>Swaps</td>
<td>656</td>
<td>56%</td>
</tr>
<tr>
<td>Total</td>
<td>1,174</td>
<td></td>
</tr>
</tbody>
</table>
### Who trades? (Spot & Forward)

<table>
<thead>
<tr>
<th></th>
<th>Daily Avg. ($billions)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trades W/ reporting</td>
<td>$689</td>
<td>59%</td>
</tr>
<tr>
<td>dealers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trades w/ other</td>
<td>$329</td>
<td>28%</td>
</tr>
<tr>
<td>financial institutions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With non-financial</td>
<td>$156</td>
<td>13%</td>
</tr>
<tr>
<td>customers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$1174 b.</td>
<td></td>
</tr>
</tbody>
</table>

### Currency Distribution of global FX market turnover (% of avg. daily turnover-max= 200%)

<table>
<thead>
<tr>
<th>Currency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>US dollar</td>
<td>90.4</td>
</tr>
<tr>
<td>Euro</td>
<td>37.6</td>
</tr>
<tr>
<td>Yen</td>
<td>22.7</td>
</tr>
<tr>
<td>British pound</td>
<td>13.2</td>
</tr>
<tr>
<td>Swiss franc</td>
<td>6.1</td>
</tr>
<tr>
<td>Canadian dollar</td>
<td>4.5</td>
</tr>
<tr>
<td>Australian dollar</td>
<td>4.2</td>
</tr>
</tbody>
</table>
**Reported Distribution of Currency Pairs:**

<table>
<thead>
<tr>
<th>Currency Pair</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>$/euro</td>
<td>30%</td>
</tr>
<tr>
<td>$/yen</td>
<td>20</td>
</tr>
<tr>
<td>$/BP</td>
<td>11</td>
</tr>
<tr>
<td>$/SF</td>
<td>5</td>
</tr>
<tr>
<td>$/CAD</td>
<td>4</td>
</tr>
<tr>
<td>$/AUD</td>
<td>4</td>
</tr>
<tr>
<td>$/other</td>
<td>17</td>
</tr>
<tr>
<td>euro/yen</td>
<td>3</td>
</tr>
<tr>
<td>euro/BP</td>
<td>2</td>
</tr>
<tr>
<td>euro/SF</td>
<td>1</td>
</tr>
</tbody>
</table>

**Geographical Distribution of Global Reported Foreign Exchange Market Turnover (April 2001)**

<table>
<thead>
<tr>
<th>Location</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom</td>
<td>31.1</td>
</tr>
<tr>
<td>United States</td>
<td>15.7</td>
</tr>
<tr>
<td>Japan</td>
<td>9.1</td>
</tr>
<tr>
<td>Singapore</td>
<td>6.2</td>
</tr>
<tr>
<td>Germany</td>
<td>5.4</td>
</tr>
<tr>
<td>Switzerland</td>
<td>4.4</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>4.1</td>
</tr>
<tr>
<td>Australia</td>
<td>3.2</td>
</tr>
<tr>
<td>Other</td>
<td>20.8</td>
</tr>
</tbody>
</table>
**Quotes in the FX Market**

Two ways of quoting: Direct and Indirect

*Direct* = home currency price of 1 unit of foreign currency

e.g. $1.50/BP means that it costs $1.50 to buy each British pound; alternatively, each British pound can be exchanged for $1.50

*Indirect* = foreign currency price of 1 unit of domestic currency

e.g. Yen 117/$ means that it costs 117 yen to buy each dollar; alternatively, each dollar can be exchanged for 117 yen

**Appreciation vs. Depreciation**

*Appreciation* of a currency:

an *increase* in the value of that currency—i.e. each unit of domestic currency buys more units of foreign currency

e.g. $/euro falls from $0.97/euro to $0.95/euro

*Depreciation* of a currency:

*Decrease* in the value of that currency—i.e. each unit of domestic currency buys fewer units of foreign currency
A cross exchange rate reflects the amount of one foreign currency per unit of another foreign currency.

Value of 1 unit of currency A in units of currency B = \[
\frac{\text{value of currency A in $}}{\text{value of currency B in $}}
\]

e.g. Yen/$ = Yen 118/$
SF/$ = SF 1.50/$

→ Yen/SF = Yen 78.67/SF

An arbitrage process known as **Triangular Arbitrage** ensures the yen/SF rate directly quoted by the bank will be approximately equal to the ratio of the yen/$ and SF/$ quotes
Online Application

Check out these foreign exchange sites:

- http://www.oanda.com/
- http://quote.yahoo.com
- http://www.bloomberg.com
- http://pacific.commerce.ubc.ca/xr/

Exchange Rate Determination:

Goal of this section is to:
- Explain how the equilibrium exchange rate is determined; and
- Examine the factors that affect the equilibrium exchange rate.
An exchange rate represents the price of a currency, which is determined by the demand for that currency relative to the supply for that currency.

**Demand for a Currency**

- Demand for a foreign currency arises as a result of the demand for goods, services, and assets which can be purchased with that currency
  - The greater the demand for these, the greater the demand for the currency

- The demand for a currency is a decreasing function of its price = exchange rate
demand for British pounds is a decreasing function of the $/£ exchange rate: All else constant,

$ \uparrow \Rightarrow \uparrow \text{cost of British goods, services and assets}$

$\Rightarrow \downarrow \text{foreign demand for British goods, services, & assets}$

$\Rightarrow \downarrow \text{demand for pounds}$

Supply of a Currency

- Supply of a foreign currency arises as a result of foreigners’ demand for another country’s goods, services, and assets---Foreign residents sell, or supply, their home currency in order to import another country’s goods, assets, or services.

- Supply of a currency is an increasing function of its price = exchange rate
  
i.e. Supply of British pounds = pounds British residents sell to obtain dollars

$\Rightarrow \text{An } \uparrow \Rightarrow \uparrow \text{ British demand for dollars and hence } \uparrow \text{ supply of pounds.}$
Economic Variables That Influence Exchange Rates

1. Relative Inflation Rates

Main Result: All else constant, an increase in one country’s rate of inflation relative to the foreign rate of inflation will cause that country’s currency to depreciate.

Suppose inflation in the U.S. increases, while inflation in U.K. remains the same:

What is the impact on the Demand and Supply of Pounds? What is the impact on the equilibrium exchange rate?

Relative Inflation Rates

U.S. inflation ↑

⇒ ↑ U.S. demand for British goods, and hence £.
⇒ ↓ British desire for U.S. goods, and hence the supply of £.
2. Relative Interest Rates

*Main Result:* An increase in a country’s real interest rate, all else constant, causes an appreciation of that country’s currency

Investors care about real, not nominal, interest rates

Real Interest Rate = nominal interest rate adjusted for expected inflation

\[ r = i - \pi \]

Where, 
- \( r \) = real interest rate on an asset
- \( i \) = nominal interest rate on asset
- \( \pi \) = expected inflation over maturity of the asset

⇒ Real interest rate represents the real purchasing power of an asset’s return

The real interest differential is:

\[ (r - r^*) = (i - i^*) + (\pi - \pi^*) \]
e.g. Suppose real interest rate in U.S. ↑ while U.K. rate remains the same:

\[ i_{us} = 6\% ; \pi_{us} = 2\% \]
\[ i_{uk} = 8\% ; \pi_{uk} = 6\% \]

real return in U.S. = 4% vs. 2% in U.K.

Relative Interest Rates

\[ \text{U.S. interest rates} \uparrow \]
\[ \Rightarrow \downarrow \text{U.S. demand for British bank deposits, and hence £.} \]
\[ \Rightarrow \uparrow \text{British desire for U.S. bank deposits, and hence the supply of £.} \]
3. Relative Income Levels: Two Possible Effects

a. Trade Balance Effect
   An increase in a country’s income increases its demand for imports
   ➔ increases demand for foreign currency
   demand for FX shifts right ➔ causes depreciation of home currency

b. Financial Flows Effect
   Increase in a country’s level of real income due to higher productivity
   ➔ expectations of higher returns
      ➔ increases demand for the assets in that country
      ➔ causes that country’s currency to appreciate
Trade Balance Effect vs. Financial Flows Effect:

4. Monetary Policy and the Money Supply

**Main Result:** An increase $M_s$ relative to $M^*$ will cause the dollar to depreciate.

Short-Run and Long-Run Effects of Money Supply Changes:

a) **Short-run effect (when prices are “sticky”):** In the short-run when goods prices and output are slow to adjust, an increase in the money supply generally reduces market interest rates.
Suppose the Central Bank decides to pursue an expansionary monetary policy: i.e. they try to increase the money supply.

Central Bank purchases T-bills (open market operations): → deposits and hence reserves in banking system increase

→ interest rates fall since banks have more cash to lend out

→ Hence, ↑ Ms → ↓ i

If prices are expected to be “sticky”, then the ↓i reflects a ↓ r (the real return on domestic assets)

Assuming no change in the foreign money supply:

↓ i → ↓ demand for home currency assets and ↑ the demand for foreign assets

→ ↑ S($/FX) (i.e. the dollar depreciates)
b) Long-run: prices flexible

In the long-run, \( \hat{M}^s \) does not change either labor and capital quantities or the productivity of those factors. Hence, the money supply does not have a long-run effect on output (money is “neutral” in the long-run).

\( \hat{M}^s \) with no long-run change in output means more money chasing the same amount of goods \( \rightarrow \) prices will rise.

\[
\text{i.e. } \hat{(M^s - M^*)} \rightarrow \hat{(P - P^*)} \rightarrow \hat{S($/FX)}
\]

Similarly,

\[
\hat{(\%\Delta M^u - \%\Delta M^*)} \rightarrow \hat{((\pi - \pi^*)}
\]

\( \rightarrow \hat{S($/FX)}
\)
c. How do Long-run and short-run exchange rate effects of a change in the money supply compare? The “Overshooting” Theory

*The immediate response of the exchange rate to a change in monetary conditions tends to be larger than the long-run response because exchange rates and interest rates adjust faster than goods prices.*

5. Current Account Balances

*Main Result:*

In the *long-run*, a country with a persistent current account deficit will experience a depreciation of its currency, while a country with a persistent current account surplus will experience an appreciation.
**Explanation for long-run:**

A country cannot have a current account deficit forever → must eventually run a current account surplus in order to repay debts

→ Currency will depreciate to generate the current account surplus

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This effect is also supported by the *portfolio balance theory*:

A country with a current account deficit pays for its excess spending by either selling its stock of foreign assets or by issuing new bonds which are purchased by the foreign country

→ increase relative supply of U.S. to foreign bonds → for foreigners to be willing to hold increased U.S. assets, must have decrease in their price → \( \downarrow S(FX/\$) \)
In the short-run, the effect depends on why the current account balance is changing:

e.g. due to change in budget deficit, or to change in investment?

The effect of the budget deficit depends on whether budget deficits raise real interest rates, or whether they create expectations that the deficit will be monetized (hence leading to expectations of higher inflation)

6. Expectations

Today’s exchange rate is influenced by expectations of what the exchange rate will be in the future

Why?

Suppose you expect $/£ to rise from today’s value of $1.50/£ to $1.55/£ in 3 months

What would a trader’s strategy be?
Trader would buy BP spot today for $1.50/BP, expecting to sell them for $1.55 in three months

⇒ Trader actions will bid up $ cost of BP in spot market

⇒ $ will depreciate today, rather than three months from now

Examples of Factors that Influence Exchange Rates

<table>
<thead>
<tr>
<th>News</th>
<th>Impact on $?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor U.S. economic indicators</td>
<td></td>
</tr>
<tr>
<td>Fed chairman suggests Fed is</td>
<td>unlikely to cut U.S. interest rates</td>
</tr>
<tr>
<td>A possible decline in German</td>
<td>interest rates</td>
</tr>
<tr>
<td>Central banks expected to</td>
<td>intervene to boost the euro</td>
</tr>
</tbody>
</table>
7. Central Bank Intervention in Foreign Exchange Markets: How Effective?

Consider the extreme case of a fixed exchange rate system:

Example: Germany and France prior to introduction of euro

Suppose Germany and France peg their currencies at the par value of FF 3/DM

This implies the central banks of Germany and France are committed to buying and selling currency at the price FF 3/DM
Par value = FF 3/DM with plus/minus FF0.10/DM bands around par value

Suppose Demand for DM increases:
excess demand for DM at existing par value

Central Banks must increase supply of DM to maintain fixed exchange rate

Central Banks buy FF and sell DM

Germany: Bundesbank can buy FF by selling DM-- How?
It prints the DM!

France: Bank of France will also buy FF and sell DM to maintain the fixed exchange rate---
But--- WHERE does it get the DM to sell?
It uses DM from its stock of international reserves

International reserves (IR) = central bank’s holdings of foreign currency
Effects of intervention to maintain an exchange rate on the money supply

The Central Bank’s Balance Sheet:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign Assets</td>
<td>Deposits held by private banks</td>
</tr>
<tr>
<td></td>
<td>Currency in Circulation</td>
</tr>
<tr>
<td>Domestic Assets</td>
<td>Monetary Base</td>
</tr>
<tr>
<td>Monetary Base</td>
<td>Monetary Base</td>
</tr>
</tbody>
</table>

Money Supply = money multiplier × Monetary Base
Monetary Base = Domestic Assets (DA) + International Reserves (IR)

$M^s = m(DA + IR)$

Note in previous example:

All else constant, Bundesbank bought FF and sold DM
→ FF are IR in Germany so **IR increase**
→ Germany’s monetary base increases
→ Germany’s money supply increases
All else constant, France also bought FF and sold DM
   → DM are IR to France so IR decrease
   → French monetary base decreases
   → French money supply decreases

Note: All this implies that a country which fixes its exchange rate gives up the ability to use monetary policy to pursue domestic goals because the money supply must be consistent with the exchange rate target!

This is an example of nonsterilized intervention

But, often intervention is “Sterilized”; i.e.
   Central bank offsets the impact of forex intervention on the money supply by changing domestic assets in the opposite direction such that \( \Delta DA = - \Delta IR \)

*The bulk of evidence suggests that sterilized intervention alone is ineffective*
Important Arbitrage Relationships

Goal is to demonstrate to important arbitrage relationships:

- Covered Interest Parity
  - Shows how interest rates and foreign exchange rates are linked
- Purchasing Power Parity
  - Shows how the prices of goods and services and exchange rates are linked

Covered Interest Parity

*Covered Interest Parity* exists when the returns on assets of equal risk, expressed in the same currency, are equal across countries.

It results when traders attempt to arbitrage return differences for a profit
Example:

Suppose can have $1 million to invest:

One-yr U.S. interest rate = $i_{us} = 2.1\%
One-yr interest rate = $i_{uk} = 4.0\%

$S(\$/£) = 1.5385/£$
$F_{1yr} (\$/£) = 1.5110/£$

If invested $1 in U.K.:

(1) Today buy £ with $ at spot rate
$1m. ÷ $1.5385/£ = £0.65m.$

(2) Today deposit £s in U.K. CD

(3) Today negotiate forward contract to sell £ for
$ in 1 year

(4) In 1 year when asset matures, sell earnings at
forward rate. Earnings =

$= £0.65(1 + 0.040) = £0.676m.$

Sell at forward rate and obtain:

£0.676m. ($1.5110/£) = $1.0214m.$
i.e. $1m. \times \left[ \frac{1}{S(\$/£)} \right] \times (1+i_{uk}) \times F(\$/£) = $1.0214m > $1.021m.

Effect on exchange rates and interest rates:
(a) $S(\$/£) \uparrow$
(b) $F(\$/£) \downarrow$
(c) $i_{us} \uparrow$
(d) $i_{uk} \downarrow$

Until total $ return on U.K. investment =
  total $ return on U.S. investment

General Expression for Covered Interest Parity

\[(1 + i_{us}) = \left[ \frac{F(\$/£)}{S(\$/£)} \right] \times (1 + i_{uk})\]

That is, interest rates, forward rates, spot rates
Move to ensure that Covered Interest Parity holds

Implication: It does not matter where you invest
Or where you borrow: returns on assets of equal
Risk will be equal when denominated in the same currency
Other Factors to Consider When Assessing Covered Interest Parity

**Transactions Costs**
- Allow for bid/ask spreads
- Differences in borrowing and lending rates

**Taxes**
Are net-of-tax returns equal??

**Risk Characteristics of Assets: Are they equal?**
  (a) Default and liquidity risk
  (b) Political Risk
  (c) Capital controls

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**Purchasing Power Parity**

Exchange rates and prices should adjust so that a given amount of currency buys the same bundle of goods in all countries.

Exchange rates and prices adjust to keep purchasing power constant

Two versions:
The Law of One Price:

\[ P = S \cdot P^* \rightarrow S = \frac{P}{P^*} \]

where
- \( P \) = $ price of good i in U.S.
- \( S \) = spot exchange rate ($/FX)
- \( P^* \) = FX Price of good i in foreign country

i.e. suppose wheat in New York costs $4.50/bushel
wheat in London costs £3/bushel

LOP says \( S($/£) = \frac{4.50}{3} = 1.50/£ \)
What if instead \( S($/£) = 1.60/£ \)?

Then, the $ cost of a bushel of wheat in London will be:

\[ \frac{1.50}{£} \times £3/\text{bushel} = \frac{4.50}{\text{bushel}} \]

vs. $4.50 in NY

If transportation costs are < $0.30/ bushel, what would be your strategy?
Buy wheat in NY and ship to London, and in the process, buy $ and sell £3:

This process would cause:

\[ P_{us} \uparrow; \ P_{uk} \downarrow; \ S/\£ \ \text{spot rate} \downarrow \]

until \[ P_{us} = S($/\£ )* \ P_{uk} \]

Note: The effect of the exchange rate on prices is called the exchange rate “pass-through” effect

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**Relative PPP:** Exchange rate changes should equal the difference between price changes in one country and price changes in another country

\[ e = \frac{S(t+T) - S(t)}{S(t)} = \frac{[(1+\pi)/(1+\pi^*)]} - 1 \]

\[ e = (\pi - \pi^*)/(1 + \pi^*) \]

\[ e \approx \pi - \pi^* \]

where,

\[ \pi = [P(t+T) - P(t)]/P(t), \text{ and } P = \text{domestic CPI} \]

\[ \pi^* = [P^*(t+T) - P^*(t)]/P^*(t), \text{ and } P^* = \text{foreign CPI} \]

\[ S(t+T) = \text{spot exchange rate T days} \]

\[ S(t) = \text{spot exchange rate today (i.e. $/FX)} \]
example:
i.e. Suppose $\pi$ in U.S. = .03, 
$\pi^*$ (U.K.) = .045

$S = \$/BP$
$[S(t+T) - S(t)] / S(t) = (.03 - .045 )/ (1+.045)$

$= -.0144$

Since inflation was higher in foreign country, domestic currency appreciates

**Empirical Evidence**
a. Law of one price:
   - Holds for certain commodities
   - but not for others

b) Relative PPP
   *Short-run*: doesn’t hold in countries with low inflation
   holds well in hyperinflationary economies

*Long-run*: evidence is mixed
Reasons for Departures from PPP:
- Transportation costs and trade restrictions
- “menu” costs
- goods may not be perfect substitutes
- - Other factors, such as real interest rates, etc.,
  dominate in the short-run

Implications of PPP for Business?

a) Effect on Competitiveness
If PPP holds, no competitive advantage
If PPP does not hold, changes in exchange rates or
prices will cause real effects on competitiveness

b) Pricing:
If arbitrage is complete, then prices cannot
diverge across markets
If arbitrage is not complete, then firms have discretion
as to how much of exchange rate changes to
“pass through” into prices